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NO. 1208 P. 1

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FACSIMILE TRANSMISSION

February 28, 2007

TO : USPTO

ATTN: EXAMINER J. SEIDLECK

FAX NO.:

TELEPHONE:

FROM: Mark J. Henry

RE: 10/528,984

YOUR REFERENCE: 103-1025-US

OUR DOCKET: 1806.1006

NO. OF PAGES (Including this Cover Sheet)

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Mark J. Henry
202-454-1520
202-454-1579

Docket No.: 1806.1006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

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Yoshito KURODA, et al.

Serial No. 10/528,984

Group Art Unit: 1711

Confirmation No. 6397

Filed: March 24, 2005

Examiner: James. J. Seidleck

For: GLYCOLIC ACID COPOLYMER AND METHOD FOR PRODUCING THE SAMEDIAGNOSIS
PROGRAM**COMMUNICATION TO THE EXAMINER**

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed February 22, 2007, enclosed is a copy of an Amendment After Allowance and Declaration, which was filed on June 9, 2006. Also enclosed is a copy of the Patent Office date-stamped postcard. Applicants respectfully request that have not yet received notification that the Amendment has been entered.

As described in the remarks of the Amendment, the changes correct formal matters and do not require substantive examination. Accordingly, it is submitted that the Amendment should be entered even though the Application has been allowed.

Entry of the Amendment After Allowance is respectively request.

Respectfully submitted,

STAAS & HALSEY LLP

Date: February 28, 2007

By: Mark J. Henry
Mark J. Henry
Registration No. 36,162

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Please Date Stamp and return

Amendment After Allowance Under 37 CFR § 1.312 Declaration

APPLICANT(S): Yoshito KURODA, et al.
SERIAL NO: 10/528,984
CONFIRMATION NO. 6397
TITLE: GLYCOLIC ACID COPOLYMER AND METHOD FOR PRODUCING THE SAME
FILING DATE: March 24, 2005
DOCKET NO: 1806.1006/MJH:nml
DUE DATE: N/A



38

S&H Form: (2/01)

Docket No.: 1806.1006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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CENTRAL FAX CENTER

In re the Application of:

FEB 28 2007

Yoshito KURODA, et al.

Serial No. 10/528,984

Group Art Unit: 1711

Confirmation No. 6397

Filed: March 24, 2005

Examiner: Acquah, Samuel A.

For: GLYCOLIC ACID COPOLYMER AND METHOD FOR PRODUCING THE
SAMEDIAGNOSIS PROGRAMAMENDMENT AFTER ALLOWANCE UNDER 37 CFR § 1.312

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

This is in response to the Notice of Allowance mailed April 4, 2006, and having a period for response set to expire on July 4, 2006, the due date for the issue fee payment.

The following amendments and remarks are respectfully submitted. Reconsideration of the claims is respectfully requested.

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STAAS & HALSEY 202-434-1501

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NO. 1208 P. 5

FEB 28 2007

Application No.: 10/528,984

IN THE SPECIFICATION:

The specification as amended below with replacement paragraphs shows added text with underlining and deleted text with ~~strikethrough~~.

Please amend the paragraph beginning at page 67, line 15 as follows:

—As an amino acid used in the present invention, a C₂-C₂₀ amino acid is preferred. Specific examples of such amino acids include glycine, (+)-alanine, β-alanine, (-)-asparagine, (+)-aspartic acid, (-)-cysteine, (+)-glutamic acid, (+)-glutamine, (-)-hydroxylysine, (-)-leucine, (+)-isoleucine, (+)-lysine, (-)-methionine, (-)-serine, (-)-threonine, (+)-valine, ~~aminolactic aminobutyric acid, azaserine, alginine and ethionine.~~—

Please amend the paragraph beginning at page 68, line 7 as follows:

—As a lactam used in the present invention, a C₂-C₂₀ lactam is preferred. Specific examples of such lactams include glycine anhydride, β-propiolactam, α-pyrrolidone, α-piperidone, ε-caprolactam, α-methyl-caprolactam, ~~α-methyl-caprolactam~~ β-methyl-caprolactam, γ-methyl-caprolactam, δ-methyl-caprolactam, ε-methyl-caprolactam, N-methyl-caprolactam, β,γ-dimethyl-caprolactam, γ-ethyl-caprolactam, γ-isopropyl-caprolactam, ε-isopropyl-caprolactam, γ-butyl-caprolactam, γ-hexacyclobenzyl-caprolactam, ω-enantholactam, ω-capryllactam, caprylolactam, laurolactam and a dimer of caprolactone.—

Application No.: 10/528,984

Please amend the paragraph beginning at page 123, line 3 as follows:

--20 mg of a glycolic acid copolymer which has been dried at 80 °C under a pressure of 1×10^2 Pa for 6 hours is weighed and, then, dissolved in 3 g of the above-mentioned eluent, followed by filtration using a filter having a mesh size of ≤ 0.2 μm , thereby obtaining a sample solution.--

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STAAS & HALSEY 202-434-1501

NO. 1208 P. 7

Application No.: 10/528,984

Please amend Table 1 at page 258 as follows:

S&H Form: (201)

		Example 1	Example 2	Example 3	Example 4	Example 5
Results of the analysis of the obtained copolymer	Weight average molecular weight (Mw)	123,000	185,000	182,000	167,000	179,000
	Content of glycolic acid monomer units (% by mole)	83.97	88.97	93.97	88.97	88.97
	Non-glycols, hydroxycarboxylic acid monomer units	Type	Lactic acid	Lactic acid	Lactic acid	6-hydroxyhexanoic acid
		Content (% by mole)	16.00	11.00	6.00	3-hydroxybutylic acid
	Average chain length		1.08	1.02	1.03	1.02
	Content of diglycolic acid monomer units (% by weight mole)		0.03	0.03	0.03	0.03
	Polyol monomer units	Type	-	-	-	-
		Content (% by mole)	-	-	-	-
	Poly carboxylic acid monomer units	Type	-	-	-	-
		Content (% by mole)	-	-	-	-
Strength of the melt-shaped sheet	Total content of polycarboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)		0.03	0.03	0.03	0.03
	Degree of discoloration of copolymer		28	29	29	28
Biodegradability of the melt-shaped sheet in soil	Degree of discoloration after the melt heat stability test		36	38	43	39
	Oxygen gas permeability of the melt-shaped sheet (cc/m ² ·day·atm)		9.1	8.0	7.2	8.1
	Strength of the melt-shaped sheet		4	6 or more	5 or more	5 or more
	Biodegradability	Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

Please amend Table 2 at page 259 as follows:

		Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4
	Weight average molecular weight (Mw)	109,000	164,000	122,000	187,000
	Content of glycolic acid monomer unit (% by weight mole)	88.86	86.97	72.96	88.97
Results of the analysis of the obtained copolymer	Non-glycolic, hydroxycarboxylic acid monomer units	Type Content (% by mole)	Lactic acid 11.01	Lactic acid 3.00	Lactic acid 11.00
	Average chain length		1.02	1.01	1.14
	Content of diglycolic acid monomer unit (% by mole)		0.13	0.03	0.03
	Polyol monomer units	Type Content (% by mole)	- -	- -	- -
Polycarboxylic acid monomer units	Polyol monomer units	Type Content (% by mole)	- -	- -	- -
	Polycarboxylic acid monomer units	Type Content (% by mole)	- -	- -	- -
	Total content of polycarboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)	0.13	0.03	0.03	0.03
	Degree of discoloration of copolymer	34	33	33	29
	Degree of discoloration after the melt heat stability test	175	115	39	105
Results of evaluation	Oxygen gas permeability of a melt-shaped sheet (cc/m ² ·day·atm)	8.2	7.0	35.0	8.4
	Strength of the melt-shaped sheet	4	5 or more	4	5 or more
	Biodegradability of the melt-shaped sheet in soil	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

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Please amend Table 3 at page 260 as follows:

		Example 6	Example 7	Example 8	Example 9	Example 10
Weight average molecular weight (Mw)		107,000	107,000	325,000	330,000	163,000
Content of glycolic acid monomer units (% by mole)		88.84	88.94	88.98	88.94	88.97
Non-glycolic, hydroxy-carboxylic acid monomer units	Type	Lactic acid	Lactic acid	Lactic acid	Lactic acid	Lactic acid
Content (% by mole)		10.99	10.99	10.96	10.98	10.94
Average chain length		1.01	1.01	1.01	1.01	1.01
Content of diglycolic acid monomer unit (% by mole)		0.03	0.03	0.03	0.03	0.04
Results of the analysis of the obtained copolymer		Neopentyl glycol	1,6- hexanediol	Trimethylolprop ane	Neopentyl glycol	Trimethylolprop ane
Polyol monomer units	Type					
Content (% by mole)		0.04	0.04	0.01	0.01	0.01
Poly(carboxylic acid monomer units	Type	-	-	-	-	-
Content (% by mole)		-	-	-	-	-
Total content of poly(carboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)		0.07	0.07	0.04	0.08	0.09
Degrees of discoloration of copolymer		29	33	34	33	39
Degrees of discoloration after the melt melt heat stability test		39	43	44	44	48
Oxygen gas permeability of a melt-shaped sheet (ccm 2-day atm)		8.3	8.2	8.3	8.6	8.7
Strength of the melt-shaped sheet		5 or more	5 or more	5 or more	5 or more	5 or more
Biodegradability of the melt-shaped sheet in soil		Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

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STAAS & HALSEY 202-434-1501

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Application No.: 10/528,984

Please amend Table 4 at page 261 as follows:

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Application No.: 10/528,984

		Example 11	Example 12	Example 13	Example 14	Example 15	Comparativ e Example 5
Weight average molecular weight (Mw)	186,000	185,000	189,000	280,000	189,000	165,000	
Content of glycolic acid monomer unit (% by mole)	88.96	88.96	88.63	88.62	88.26	93.95	
Non-glycolic, hydroxycarboxylic acid monomer units	Type	Lactic acid					
Content (% by mole)		10.06	10.98	9.57	9.56	7.93	4.21
Average chain length		1.01	1.01	1.05	1.01	1.05	1.02
Content of diglycolic acid monomer unit (% by mole)	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Polyol monomer units	Type	Neopentyl glycol					
Content (% by mole)		0.04	0.04	0.04	0.04	0.04	0.04
Polycarboxylic acid monomer units	Type	-	Oxalic acid	Adipic acid	Adipic acid	Adipic acid	Adipic acid
Content (% by mole)		-	0.01	0.87	0.88	1.88	0.89
Total content of Polycarboxylic acid monomer units (including polyol monomer units and diglycolic acid monomer units (% by mole)	0.08	0.08	1.80	1.82	3.82	1.84	
Degree of discoloration of copolymer	29	28	30	33	30	34	
Degree of discoloration after the field melt heat stability test	40	39	39	42	38	110	
Oxygen gas permeability of a melt-shaped sheet (cc/m ² .day atm)	8.5	8.5	8.8	9.2	12.0	8.3	
Strength of the melt-shaped sheet	5 or more						
Biodegradability of the melt-shaped sheet [in soil]	Biodegradable a	Biodegradable a	Biodegradable a	Biodegradable a	Biodegradable a	Biodegradable a	

Note: "—" means "not detected".

Application No.: 10/528,984

Please amend Table 5 at page 262 as follows:

		Example 16	Example 17	Example 18	Example 19	Example 20
Weight average molecular weight (Mw)		178,000	148,000	132,000	152,000	93,000
Content of glycolic acid monomer unit (% by mole)		88.93	88.93	88.91	88.92	88.98
Non-glycolic, hydroxycarboxylic acid monomer units	Type	Lactic acid				
	Content (% by mole)	11.00	11.01	11.01	11.01	11.00
Average chain length		1.02	1.05	1.02	1.02	1.02
Content of diglycolic acid monomer unit (% by mole)		0.02	0.06	0.08	0.07	0.02
Results of the analysis of the obtained copolymer	Type	-	-	-	-	-
Polyol monomer units	Content (% by mole)	-	-	-	-	-
Poly(hydroxyacrylic acid) monomer units	Type	-	-	-	-	-
Total content of polycarboxylic acid monomer units including polyal monomer units and diglycolic acid monomer units (% by mole)	Content (% by mole)	-	-	-	-	-
Degrees of discoloration of copolymer		0.02	0.06	0.08	0.07	0.02
Degree of discoloration after the field melt heat stability test		28	28	28	28	27
Results of evaluation	Oxygen gas permeability of a melt-shaped sheet (ccm ² .day atm)	39	44	48	48	38
	Strength of the melt-shaped sheet	8.1	8.1	8.0	8.0	8.1
	Biodegradability of the melt-shaped sheet in soil	5 or more	5 or more	5 or more	4	4
		Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

Application No.: 10/528,984

Please amend Table 6 at page 263 as follows:

		Comparative Example 6	Comparative Example 7	Comparative Example 8	Comparative Example 9	Comparative Example 10	Comparative Example 11
Weight average molecular weight (MW)		186,000	179,000	184,000	109,000	175,000	183,000
Content of glycolic acid monomer unit (% by mole)		68.59	68.56	68.62	68.84	94.80	83.00
Non-glycolic, hydroxycarboxylic acid monomer units	Type	Lactic acid	Lactic acid				
Content (% by mole)		11.00	11.00	11.00	11.02	6.00	17.00
Average chain length		1.02	1.02	1.02	1.02	2.08	2.36
Content of diglycolic acid monomer unit (% by mole)		0.20	0.21	0.18	0.14	-	-
Polyol monomer units	Type	Neopentyl glycol	Neopentyl glycol	Neopentyl glycol	-	-	-
	Content (% by mole)	0.21	0.21	0.20	-	-	-
Polycarboxylic acid monomer units	Type	-	-	-	-	-	-
	Content (% by mole)	-	-	-	-	-	-
Total content of polycarboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)		0.41	0.42	0.38	0.14	-	-
Degree of discoloration of copolymer test		40	39	37	38	30	29
Oxygen gas permeability of a melt-shaped sheet (ccm ² ·day·cm)		224	242	193	158	92	58
Strength of the melt-shaped sheet		5 or more	5 or more	6 or more	4	5 or more	5 or more
Biodegradability of the melt-shaped sheet in soil		Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

Application No.: 10/528,984

REMARKS

Amendments to page 67, line 22, page 68, line 11 and page 123, line 7 are merely corrections of inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification. Amendments to page 258, Table 1 and page 259, Table 2 (i.e., the amendments to change "% by weight" to --% by mole--) are also merely corrections of inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification.

In support of the above-mentioned amendments, the Applicant attaches hereto a DECLARATION to verify that the amendments are made only to correct inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification.

Amendments to page 260, Table 3, page 261, Table 4, page 262, Table 5 and page 263, Table 6 are merely corrections of apparent clerical errors. Support for these amendments (to change "melt" to --melt--) is found, for example, at page 258, Table 1 (after "Degree of discoloration after the") of the present specification.

In accordance with the above, it is submitted that the foregoing changes should not require further substantive consideration by the Examiner. Accordingly, entry at this after-final stage of prosecution is fully appropriate. The Examiner is requested to issue a Supplemental Notice of Allowability to confirm that the changes have been entered. Because the application has been allowed, this matter is somewhat urgent.

Finally, if there are any formal matters remaining after this Amendment, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: July 9 2006

By: M.J.Henry
Mark J. Henry
Registration No. 36,162

1201 New York Avenue, NW, Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500
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DECLARATION

I, Kenji KABUKI, c/o the Inoue & Associates of 3rd Floor, Akasaka Habitation Building, 3-5, Akasaka 1-chome, Minato-ku, Tokyo, Japan do solemnly and sincerely declare that I am conversant with the Japanese and English languages and that I believe:

that the description "aminolactic acid" at page 67, line 22 of the English specification should be amended to
--aminobutyric acid--;

that the description " α -methyl-caprolactam" at page 68, line 11 of the English specification should be amended to
-- β -methyl-caprolactam--;

that the description "2" at page 123, line 7 of the English specification should be amended to --0.2--;

that the description "% by weight" at page 258, Table 1 (after "Content of diglycolic acid monomer units") of the English specification should be amended to --% by mole--; and that the description "% by weight" at page 259, Table 2 (after "Content of glycolic acid monomer unit") of the English specification should be amended to --% by mole--.

These amendments are merely corrections of inadvertent errors which occurred at the time of the translation into

English of the original PCT specification. The attached copies of revised pages 67, 68, 123, 258 and 259 of the English specification are true and correct translations of the corresponding pages of the international patent application No. PCT/JP03/12165. The English description "aminobutyric acid" in the English specification at page 67, line 22 is a correct English translation of the Japanese description "アミノ酪酸" in the original Japanese PCT specification at page 57, line 8. The English description " β -methyl-caprolactam" in the English specification at page 68, line 11 is a correct English translation of the Japanese description " β -メチル-カプロラクタム" in the original Japanese PCT specification at page 57, line 21. The English description "0.2" in the English specification at page 123, line 7 is a correct English translation of the Japanese description "0. 2" in the original Japanese PCT specification at page 95, lines 7 to 8. The English description "% by mole" in the English specification at page 258, Table 1 (after "Content of diglycolic acid monomer units") is a correct English translation of the Japanese description "モル%" in the original Japanese PCT specification at page 179, Table 1 (after "ジグリコール酸単位含有率"). The English description "% by mole" in the English specification at page 259, Table 2 (after "Content of glycolic acid monomer unit") is a

correct English translation of the Japanese description "モル%" in the original Japanese PCT specification at page 180. Table 2 (after "グリコール酸単位含有率").

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

March 29, 2005

(Date)

Kenji Kabuki

Kenji KABUKI

lected from the group consisting of aliphatic dicarboxylic acids, such as oxalic acid, malonic acid, glutaric acid, succinic acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, undecanedicarboxylic acid, dodecanedicarboxylic acid and 1,4-cyclohexanedicarboxylic acid, and a derivative thereof, and aliphatic tricarboxylic acids, such as propanetricarboxylic acid, trimellitic acid, pyromellitic acid and 1,3,6-hexanetricarboxylic acid, and a derivative thereof.

10

In addition, other compounds, such as an amino acid, a polyamine and a lactam, may be used as a comonomer in an amount which does not adversely affect the properties of the present invention.

15 As an amino acid used in the present invention, a C₂-C₂₀ amino acid is preferred. Specific examples of such amino acids include glycine, (+)-alanine, β-alanine, (-)-asparagine, (+)-aspartic acid, (-)-cysteine, (+)-glutamic acid, (+)-glutamine, (-)-hydroxylysine, (-)-leucine, (+)-isoleucine, 20 (+)-lysine, (-)-methionine, (-)-serine, (-)-threonine, (+)-valine, aminobutyric acid, azaserine, alginine and ethionine.

20

As a polyamine used in the present invention, a C₁-C₂₀ polyamine is preferred. Specific examples of

such polyamines include methylhydrazine, monomethyl-
enediamine, dimethylenediamine, trimethylenediamine,
tetramethylenediamine, pentamethylenediamine, hexame-
thylenediamine, heptamethylenediamine, octamethyl-
5 enediamine, nonanemethylenediamine, decamethylenedia-
mine, undecamethylenediamine and dodecamethylenediamine.

As a lactam used in the present invention, a C₂-C₂₀ lactam is preferred. Specific examples of such lactams include glycine anhydride, β -propiolactam, α -pyrrolidine, α -piperidone, ε -caprolactam, α -methyl-caprolactam, β -methyl-caprolactam, γ -methyl-caprolactam, δ -methyl-caprolactam, ε -methyl-caprolactam, N-methyl-caprolactam, β,γ -dimethyl-caprolactam, γ -ethyl-caprolactam, γ -iso-propyl-caprolactam, ε -isopropyl-caprolactam, γ -butyl-caprolactam, γ -hexacyclobenzyl-caprolactam, ω -enantholactam, ω -capryllactam, caprylolactam, laurolactam and a dimer of caprolactone.

Among the above-mentioned compounds, when a com-
20 pound has an asymmetric carbon atom and the compound exists in a D-form, an L-form or a mixture of D- and L-forms, any one of these forms may be used.

With respect to the forms of the raw materials used (i.e., glycolic acid, a derivative of glycolic acid, and a compound copolymerizable with glycolic acid 25 and/or derivative of glycolic acid), there is no par-

hexafluoroisopropanol to prepare a solution (hereinafter referred to simply as "eluent").

20 mg of a glycolic acid copolymer which has been dried at 80 °C under a pressure of 1×10^2 Pa for 6 hours is weighed and, then, dissolved in 3 g of the above-mentioned eluent, followed by filtration using a filter having a mesh size of 0.2 µm, thereby obtaining a sample solution.

With respect to the sample solution, GPC is performed under conditions wherein the column temperature is 40 °C and the flow rate of the eluent is 1 ml/minute. In the GPC, the sample solution is flowed through three different columns (TskguardcolumnHHR-H (tradename) as a guard column; and Tskgel (tradename) G5000HHR and Tskgel (tradename) G3000HHR, each of which is manufactured and sold by TOSOH Corporation, Japan) which are connected in series. A calibration curve is obtained in advance from the elution times of standard monodisperse polymethyl methacrylate samples (which, respectively, have known weight average molecular weights of 1,577,000, 685,000, 333,000, 100,250, 62,600, 24,300, 12,700, 4,700, 1,680 and 1,140) (manufactured and sold by Polymer Laboratories Ltd, U.K.) and a methyl methacrylate monomer (molecular weight: 100). which elution times are determined by an RI detector. The

Table 1

		Example 1	Example 2	Example 3	Example 4	Example 5
Weight average molecular weight (M _w)		123,000	186,000	182,000	167,000	179,000
Content of glycolic acid monomer units (# by mole)		83.97	88.97	93.97	88.97	88.97
Non-glycolic, hydroxycarboxylic acid monomer units	Type	Lactic acid	Lactic acid	Lactic acid	6-hydroxyhexanoic acid	3-hydroxybutyric acid
Content (# by mole)		16.00	11.00	6.00	11.00	11.00
Average chain length		1.08	1.02	1.02	1.03	1.02
Results of the analysis of the obtained copolymer	Content of diglycolic acid monomer units (# by mole)	0.03	0.03	0.03	0.03	0.03
Polyol monomer units	Type	-	-	-	-	-
Content (# by mole)		-	-	-	-	-
Polycarboxylic acid monomer units	Type	-	-	-	-	-
Content (# by mole)		-	-	-	-	-
Total content of polycarboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (# by mole)		0.01	0.01	0.01	0.01	0.01
Degree of discoloration of copolymer	28	29	29	29	28	28
Degree of discoloration after the melt heat stability test	36	38	43	18	39	39
Oxygen gas permeability of the melt-shaped sheet (cc/m ² .day.atm)	9.1	8.0	7.2	8.1	8.0	8.0
Strength of the melt-shaped sheet	4	5 or more	5 or more	5 or more	5 or more	5 or more
Biodegradability of the melt-shaped sheet in soil	Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

Table 2

		Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4
Weight average molecular weight (Mw)		109,000	164,000	122,000	187,000
Content of glycolic acid monomer unit (% by mole)		88.86	96.97	72.96	88.97
Non-glycolic, hydroxycarboxylic acid monomer units	Type	Lactic acid	Lactic acid	Lactic acid	Lactic acid
Results of the analysis of the obtained copolymer	Content (% by mole)	11.01	3.00	27.01	11.00
	Average chain length	1.02	1.01	1.14	1.62
Content of diglycolic acid monomer unit (% by mole)		0.13	0.03	0.03	0.03
Polyol monomer units	Type	-	-	-	-
Polycarboxylic acid monomer units	Content (% by mole)	-	-	-	-
Total content of polycarboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)	Content (% by mole)	-	-	-	-
Degree of discoloration of copolymer	14	33	33	29	29
Degree of discoloration after the melt heat stability test	175	115	39	105	105
Results of evaluation	Oxygen gas permeability of a melt-shaped sheet (cc/cm ² day atm)	8.2	7.0	35.0	8.4
	Strength of the melt-shaped sheet	4	5 or more	4	5 or more
	Biodegradability of the melt-shaped sheet in soil	Biodegradable	Biodegradable	Biodegradable	Biodegradable

Note: "-" means "not detected".

アミノ酸としては、炭素数2～20のアミノ酸が好ましい。アミノ酸として、例えば、グリシン、(+) -アラニン、 β -アラニン、(-) -アスパラギン、(+) -アスパラギン酸、(-) -システィン、(+) -グルタミンサン、(+) -グルタミン、(-) -ヒドロキシリシン、(-) -ロイシン、(+) -イソロイシン、(+) -リシン、(-) -メチオニン、(-) -セリン、(-) -トレオニン、(+) -バリン、アミノ酪酸、アザセリン、アルギニン、エチオニン等が挙げられる。

多価アミンとしては、炭素数1～20の多価アミンが好ましい。アミンとして、例えば、メチルヒドラジン、モノメチレンジアミン、ジメチレンジアミン、トリメチレンジアミン、テトラメチレンジアミン、ペンタメチレンジアミン、ヘキサメチレンジアミン、ヘプタメチレンジアミン、オクタメチレンジアミン、ノナメチレンジアミン、デカメチレンジアミン、ウンデカメチレンジアミン、ドデカメチレンジアミン等が挙げられる。

ラクタムとしては、炭素数2～20のラクタムが好ましい。ラクタムの具体例として、グリシン無水物、プロパンラクタム、 α -ピロリドン、 α -ピペリドン、 ε -カプロラクタム、 α -メチル-カプロラクタム、 β -メチル-カプロラクタム、 γ -メチル-カプロラクタム、 δ -メチル-カプロラクタム、 ε -メチル-カプロラクタム、N-メチル-カプロラクタム、

ルオロイソプロパノールを調製しておく。具体的には、ヘキサフルオロイソプロパノール 1000 g に対して、トリフルオロ酢酸ナトリウム 6.48 g を溶解して溶液（以下、「溶離液」と略記する）を調製する。

評価用グリコール酸共重合体の試料溶液としては、80°C、 1×10^2 Pa で 6 時間乾燥したグリコール酸共重合体 20 mg を精秤した後、前記溶離液 3 g に溶解し、その後、0.2 μm のフィルターにて濾過したものを用いる。

カラム温度 40°C にて、溶離液を流量 1 ml / 分の条件下でカラム（カラム構成は、ガードカラムとして日本国東ソー（株）社製 Tskguard column HHR-H（登録商標）を用い、日本国東ソー（株）製 Tskgel（登録商標）G5000HHR、及び日本国東ソー（株）製 Tskgel（登録商標）G3000HHR の各 1 本ずつを直列に配置】を通して、分子量 1,577,000, 685,000, 333,000, 100, 250, 62, 600, 24, 300, 12, 700, 4, 700, 1, 680, 1140 の、分子量既知の英國 Polymer Laboratories 社製单分散ポリメタクリル酸メチル標準物質、及びメタクリル酸メチルモノマー（分子量 100）の R I 検出による溶出時間から求めた検量線を予め作成し、その溶出時間から重量平均分子量を算出する。

(4) グリコール酸共重合体の融点

表 1

		実施例1	実施例2	実施例3	実施例4	実施例5
重量平均分子量(Mw)	123,000	186,000	182,000	167,000	179,000	
グリコール酸単位以外の ヒドロキシカルボン酸単位	含有率(モル%)	83.97	88.97	93.97	88.97	88.97
得られた 共重合体 の分析値	種類	乳酸	乳酸	6-ヒドロキシヘキサノイク アシト	3-ヒドロキシヘキサノイク アシト	
	含有率(モル%)	16.00	11.00	6.00	11.00	11.00
	平均連鎖長	1.08	1.02	1.02	1.03	1.02
	ジグリコール酸単位含有率(モル%)	0.03	0.03	0.03	0.03	0.03
ポリオール単位	種類	—	—	—	—	—
	含有率(モル%)	—	—	—	—	—
ポリカルボン酸 単位	種類	—	—	—	—	—
	含有率(モル%)	—	—	—	—	—
ポリオール単位とジグリコール酸単位 を含めたポリカルボン酸単位の含有 率の総和(モル%)	—	—	—	—	—	—
樹脂の着色度	—	—	—	—	—	—
	溶融熱安定性評価後の着色度	28	29	29	29	28
評価値	溶融成形シートの酸素ガス透過度 (cc/m ² ·day·alm)	36	38	43	38	39
	溶融成形シートの強度	9.1	8.0	7.2	8.1	8.0
	溶融成形シートの土中腐壊性	4	5以上	5以上	5以上	5以上
		有り	有り	有り	有り	有り

一印:検出されないことを示す。

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表2

		比較例1	比較例2	比較例3	比較例4
重量平均分子量(Mw)	109,000	164,000	122,000	187,000	
グリコール酸単位含有率(モル%)	88.86	96.97	72.96	88.97	
グリコール酸単位以外のヒドロキシカルボン酸単位	種類 含有率(モル%)	乳酸 11.01	乳酸 3.00	乳酸 27.01	乳酸 11.00
平均連鎖長	1.02	1.01	1.14	1.62	
ジグリコール酸単位含有率(モル%)	0.13	0.03	0.03	0.03	
得られた共重合体の分析値	ポリオール単位 種類 含有率(モル%)	— —	— —	— —	— —
	ポリカルボン酸単位 種類 含有率(モル%)	— —	— —	— —	— —
	ポリオール単位とジグリコール酸単位の含有率の総和(モル%)	0.13	0.03	0.03	0.03
	樹脂の着色度	34	33	33	29
溶融熱安定性評価後の着色度	175	115	39	105	
溶融成形シートの酸素ガス透過度(cc/m ² ·day·atm)	8.2	7.0	35.0	8.4	
溶融成形シートの強度	4	5以上	4	5以上	
溶融成形シートの土中崩壊性	有り	有り	有り	有り	

—印:検出されないと示す。